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Checklist of earthworms (Oligochaeta: Lumbricidae) from Serbia: a review

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Abstract

A checklist of the lumbricid earthworms in Serbia is presented. For the first time, comprehensive informations of all lumbricids in the country are given in order to establish the definitive list of known taxa from Serbia. The list underlines earthworm diversity and provides a general overview of their ecology, distribution in Serbia, and zoogeographical position. The complete list of earthworm taxa of Serbia comprises 74 species and subspecies of Lumbricidae, belonging to 15 genera. One third of earthworms in Serbia are endemics (26 taxa = 35.1%).

Key words: Lumbricidae, earthworms, distribution, zoogeography, Serbia

Introduction

The Balkan Peninsula is one of the hotspots of biodiversity in Europe; frequent changes in global ecological conditions throughout geological history have greatly contributed to the occurrence of an exceptionally heterogenous fauna (Griffiths *et al*. 2004). Serbia is situated at the crossroads of Central and Southeast Europe, covering the the central part of the Balkan Peninsula. According to the European Environment Agency (EEA 2011), two biogeographic regions are present in Serbia: Pannonian and Continental. The Pannonian biogeographic region is situated in the part of the southern Pannonian Region and covers the northern part of Serbia (Vojvodina Province), while the Continental part of territory of Serbia is located on the Balkan Peninsula. The Pannonian part of Serbia is predominantly a flat region. More than two-thirds of the territory are used for agriculture and only 6% is covered by forests. The rest of the territory belongs to meadows and hill pastures.

The territory of the Balkan part of Serbia is a hilly-mountainous area. The Rhodope Mountains occupy the central part of the mountain areas and stretch along the right and the left side of the South Morava and the Great Morava. It is the oldest mountain range in the Balkans. The northern border of the Rhodope Mountains is represented by the Ancient Mountains in the central part of Serbia, which Cvijić (1922) classified as a transitional zone between the Dinarides and the Carpatho-Balkan Mountains. Lower hills and isolated mountains are prevailing in central Serbia. Ancient mountains in the southern and southeast corner of the country belong to the Rilo-Rhodope Mountain system. Dinaric Alps stretch in the west and the southwestern part of the country while in the east area, there is the Carpatho-Balkan mountain system composed of ancient metamorphic limestone. The basic geological mass of the Balkan mountain system in eastern Serbia is the western part of the Stara Planina Mts., which is joined by many of the mountains from eastern Serbia.

The first data on earthworms of Serbia were provided by Cognetti (1906), Černosvitov (1931, 1938, 1939, 1942), Remy (1953). Their work was continued by Pop (1968), Karaman (1972, 1973), Šapkarev (1972, 1975, 1977, 1980), Zicsi & Šapkarev (1982) and Karaman (1983). Investigations of earthworms from Serbia have intensified in the 90s and were continued after this period (Mršić 1991; Karaman & Stojanović 1993, 1994, 1995, 1996a, 1996b, 1998, 2002, 2002; Karaman *et al*. 1998; Stojanović 1989, 1996; Šapkarev 2002; Stojanović & Karaman 2005, 2007; Stojanović *et al*. 2008; Milutinović *et al*. 2010; Szederjesi 2013; Milutinović *et al*. 2013; Stojanović *et al*. 2013; Stojanović & Milutinović 2014; Milutinović 2014; Stojanović *et al*., 2014; Milutinović *et*

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